

The present invention presents a method for determining shallow water flow risk using seismic data. The seismic data can be processed to enhance its stratigraphic resolution by sub-sampling the seismic data to less than a two-millisecond interval. Performing a stratigraphic analysis on the seismic data and evaluating the seismic attributes of the seismic data can be used to select a control location. A pre-stack waveform inversion is applied to seismic data at a selected control location to provide an elastic model, which includes pressure-wave velocity and shear-wave velocity. The shallow water flow risk is then determined using the elastic model by comparing the pressure-wave velocity to the shear-wave velocity. A post-stack inversion can be applied on the seismic data using the elastic model to model a 3D volume to determine the shallow water flow risk across the 3D volume.

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